State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Aquatic Resources
Honolulu, Hawaii 96813

June 9, 2006

Board of Land and
Natural Resources
Honolulu, Hawaii

RESUBMITTAL OF A REQUEST FOR AUTHORIZATION/APPROVAL TO ISSUE ONE (1) NORTHWESTERN HAWAIIAN ISLANDS (NWHI) RESEARCH, MONITORING AND EDUCATION ACCESS PERMIT TO DR. GEORGE ANTONELIS, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), NATIONAL MARINE FISHERIES SERVICE, VALID FROM JUNE 9, 2006 TO SEPTEMBER 15, 2006, AT FRENCH FRIGATE SHOALS TO REMOVE GALAPAGOS SHARKS FOR THE PURPOSE OF ENHANCING THE SURVIVAL OF MONK SEAL PUPS

Submitted herewith for your authorization and approval is a request for issuance of a NWHI Access Permit to Dr. George A. Antonelis NOAA, National Marine Fisheries Service. The Research, Monitoring and Education Permit, described below, will allow activity to occur in the NWHI State Marine Refuge (0-3 miles) waters surrounding French Frigate Shoals. The activities covered under this permit will occur from June 9, 2006 to September 15, 2006, as outlined below and in the attached permit application. This permit application was previously submitted in conjunction with an application that requested access to numerous sites within the NWHI for monk seal recovery and management efforts, and to census cetaceans. The permit was granted for the other activities but the Board of Land and Natural Resources (BLNR) deferred on the issuance of the permit for the removal of sharks to enhance the survival of monk seal pups.

This permit application is a re-submittal of this experimental activity to enhance the survival of Hawaiian monk seal pups. Survival of Hawaiian monk seal pups at French Frigate Shoals is compromised by Galapagos sharks. These events have been documented only at French Frigate Shoals; therefore, efforts are proposed to mitigate against Galapagos shark predation occurring there. Seven years of intensive observations have revealed that Galapagos sharks hunt or pursue pre-weaned monk seal pups in shallow water during monk seal pupping season. This behavior is persistent and predictable, and can be used to target individual sharks for removal. Galapagos sharks identified for removal will have exhibited conspicuous predatory behavior, defined as actively pursuing or hunting for pre-weaned pups in water less than two meters deep. Predefined sighting areas will be designated for fishing activities, and targeting/culling of sharks will involve hooks, harpoon, and/or the option of using a high-powered rifle. The application requests approval for the removal of up to 15 Galapagos sharks.

REVIEW PROCESS

The previous permit application was received by the Division of Aquatic Resources on March 13, 2006. It was sent out for review and comment to the following scientific entities: Division of Aquatic Resources staff (5), Northwestern Hawaiian Islands Reserve, United States Fish and Wildlife Service. Native Hawaiians from the Office of Hawaiian Affairs, and the Kaho'olawe Island Reserve Commission were also consulted.

This application was first submitted to the BLNR on March 24, 2006 where the Board approved 3 other research activities but deferred making a decision on the shark culling activities included in the original permit application. The Board requested staff to coordinate consultations between the applicant and Native Hawaiians who had expressed concern regarding this activity. The Board further directed staff to work with the U.S. Fish and Wildlife Service to ensure that they were also provided opportunity to consult and issue permits for their Wildlife Refuge at French Frigate Shoals.

Comments received from DAR staff were summarized and previously presented to the Board as follows:
One staff member (protect species program coordinator) is familiar with the issues regarding the critical decline in the monk seal population and has no problem with this activity. Another staff member is a shark expert and familiar with shark issues in the Main Hawaiian islands. He has concerns with the proposed shark culling at Trig Islet in French Frigate Shoals. He questioned whether there was evidence to show that the Galapagos sharks are the true predators of monk seal pups. He was also not sure that there is existing data given annual fluctuations in climatic conditions to justify and ensure that predation behavior is not more variable than outlined in the application. He was concerned about the use of high-powered rifles and thought that this would not be an effective method to kill sharks and may create more of a problem by attracting more sharks to the area to feed on a wounded shark. The catch per unit of effort of current shark culling is very low and he recommended that if the Board decided to allow shark culling, 5 sharks be allowed.

Comments were received from Native Hawaiian cultural practitioners who work for the Kaho'olawe Island Reserve Commission and who sought comments from other practitioners. Their comments are included as Attachment 1 and stated that culling sharks is not justified.

Comments received from Environmental Defense Hawai'i that where submitted during the March 24, 2006 Land Board hearing are also attached and questioned the shark culling activities. (Attachment 2)

RESPONSE:

Since the March 24 BLNR meeting, Division of Aquatic Resources (DAR) staff have organized two consultations (one on April 24 and another on May 12, 2006) with the applicant, Native Hawaiians, the NWHI Reserve and the U.S. Fish and Wildlife Service. Staff from DAR invited a number of Native Hawaiian practitioners, many whom had previously been consulted during

the development of the State Marine Refuge permit guidelines, to be present during the consultation process on the issue of shark culling to enhance the survival of monk seals at French Frigate Shoals. A small group of staff representing Native Hawaiians from the Kaho'olawe Island Reserve Commission (KIRC), Office of Hawaiian Affairs (OHA), and the University of Hawaii, Hawaiian language studies program met with DAR staff and staff from the National Marine Fisheries Service (NMFS), NWHI Coral Reef Ecosystem Reserve and U.S. Fish and Wildlife Service to discuss this issue. Two meetings where held over the course of 3 weeks and an additional meeting was held in Maui between staff from the NWHI Reserve, OHA and KIRC.

Findings from the Maui meeting were presented at the May 12 meeting from the NWHI Reserve and Native Hawaiian organizations (Attachment 3). This group stated that all permitted research applications should serve the dual purpose of meeting the needs of scientific research and be of use for the perpetuation of cultural practices.

At the May 12 meeting, the applicant agreed to the following before re-submitting the application to the BLNR:

- He would not ask for the application to be re-submitted to the BLNR on May 26;
- He would attend the NWHI Reserve Native Hawaiian working group meeting on May 19-20, 2006 where this proposed activity would be discussed; and
- He would attend the NWHI State Marine Refuge Native Hawaiian Advisory Committee meeting to be held in June where this proposed activity would also be discussed.

Since that time, the NWHI Reserve invited the NWHI State Marine Refuge Native Hawaiian Advisory Committee to join with Reserve's Native Hawaiian working group to discuss this issue and several other issues of concern regarding the NWHI. The meeting was held over the course of 2 days at the Reserve offices on May 19-20, 2006. While not all members of the State's Marine Refuge Native Hawaiian Advisory Group could attend the meeting, several members who had been previously involved in the discussions were in attendance for all or a part of the dialog. Key staff members from KIRC were not however able to attend the meetings.

After significant discussion the NWHI Reserve's Native Hawaiian working group (who also include some of the members of the State Marine Refuge Native Hawaiian Advisory Committee) members agreed to allow the culling of the Galapagos sharks at the levels recommended previously by the State and under the following conditions:

1) The State reconvene its own cultural advisory committee after working out legal issues (some form of confidentiality agreement among members, etc.) to meet on this and other permit applications that pertain to the Native Hawaiian culture and practices in the NWHI;
2) Have Dr. Antonelis follow up with the suggestion of having a Native Hawaiian practitioner on the monk seal recovery team and present when the sharks are killed; and
3) If limited shark culling is done, as expressed in the permit application, it would have to be done using the proper cultural protocol and any use of the shark would have to be: a) studied to help find answers to their unique behavior, and b) with the purpose of

perpetuating cultural practices by using those parts of the shark that can be saved for Native Hawaiian uses.

AMENDMENTS REQUESTED SUBSEQUENT TO APPLICATION SUBMISSION:

Applicant has submitted an amended application which incorporates Native Hawaiian cultural and traditional uses in the project and addresses issues raised during the BLNR hearing on March 24, 2006.

Applicant has submitted documents with the amended application, which suggest that Applicant has obtained recommendation and authorization from the NWHI Ecosystem Reserve Cultural Advisory Council and the US Fish and Wildlife Service, Hawaiian Islands National Wildlife Refuge, for the removal of up to five sharks.

Applicant has also submitted a memorandum in support of his position and to justify the removal of up to fifteen Galapagos sharks, and a separate letter to inform staff of the most recent development of possible Monk Seal pup losses at French Frigate Shoals. The applicant has also shared and documented shark predation on this year's pre-weaned pups.

FINAL STAFF RECOMMENDATIONS:

1) Approve the request for access to State waters at French Frigate Shoal in order to capture, remove and kill Galapagos sharks;
2) Allow the removal of five (5) such sharks under this permit, with the potential to remove up to no more than five (5) additional sharks after additional consultation;
3) Do not allow the use of a high powered rifle for the shark removal;
4) Instruct Applicant to continue to seek alternative methods of monk seal pup survival that do not involve the culling of sharks; and
5) Instruct Applicant to engage in further and continuous explanation, consultation and collaboration with agencies and individuals representing Native Hawaiians and their practices.

RECOMMENDATION:

"That the Board authorize and approve, with stated conditions, a Research, Monitoring and Education Permit to Dr. George A. Antonelis of the National Oceanic and Atmospheric Administration, for activities and access within the State waters of the NWHI, and for the removal of up to five (5) Galapagos sharks within the State waters."

Respectfully submitted,

DAN POLHEMUS
Administrator

APPROVED FOR SUBMITTAL

PETER T. YOUNG
Chairperson

LINDA LINGLE
GOVERNOR OF HAWAI'I

KŪKULU KE EA A KANALOA

COMMISSION MEMBERS

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Executive Director

KAHO'OLAWE ISLAND RESERVE COMMISSION

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March 17, 2006

MEMORANDUM

To: Athline M. Clark
Special Projects Program Manager
Hawaii Division of Aquatic Resources
Department of Land and Natural Resources
1151 Punchbowl St. Rm. 330
Honolulu, Hawaii 96813

From: Sol P. Kaho`ohalahala
Executive Director, KIRC

Subject: Pacific Islands Fisheries Science Center NWHI Application

I appreciate the opportunity to make comments on the permit application for a new research, monitoring and education project in the State Marine Refuge. In this brief review period I submit the following comments below in light of my current capacity as the person responsible for the resources management of the Kaho'olawe Island Reserve and as one who supports the preservation and practice of all rights customarily and traditionally exercised by native Hawaiians for cultural and subsistence purposes.

Further, the comments made herein are in consultation with marine and cultural experts. These are our collaborative concerns:

We are concerned that the applicant places value on one native species over another native species in a pristine marine habitat. The perception is that of humans attempting to play or assume the role of "creator". From a cultural perspective, we believe that the Northwest Hawaiian islands are our kupuna islands in a natural state of balance or pono.

We raise the following issues for further consideration and elaboration:

ATTACHMENT 1

- There seems to be a lack of concern on the importance of the Galapagos shark on the ecosystem impacts in the terms of weeding the sick monk seals.

- It is inferred that when unweaned pups disappear it is due to shark predation.

- There is no discussion or evidence of other interactions such as other predators like ulua that dominate the nearshore waters.

- Is there impact by disease?

- Are there observations on the "aggressive males" and their impact on pups?

- The large variance between confirmed, probable and possible is of great concern. I would like to see overall mortality and not just assume that "disappearances inferred to be predation due to absence of any other comprising factors". The kupuna islands are complex ecosystems that should not be simply reduced to generalizations about predation and mortality, more research is needed before the request to remove or kill another native species.

- The carcass of pups with wounds from the Galapagos sharks can't always dictate that the actual death was caused by a Galapagos shark. The mano are scavengers also.

- Research simulated models seem to indicate that the culling of Galapagos sharks will have no effect on the ecosystem. I would like input from native Hawaiian practitioners, Allen Friedlander, Randy Kosaki, invertebrate biologist, botanist and input from the Northwestern Hawaiian Island regional council. How can they say "no effect" when you remove an apex predator in an apex predator dominated ecosystem.

- Need to have more input from Native Hawaiians and their inclusion in the Pacific Islands Fisheries Science Center.

- Finally the deaths of seal pups while tragic were part of a natural process. If mortality from a non-native or non-natural process occurred then there should be concern and action.

In closing, let me briefly reiterate the fact that our native Hawaiian ancestral belief system continues to be guided by Kupuna who constantly remind that pono, the balance between gather and restoring, exists as a practice that was pertinent then and now.

There are more questions that are raised with review of this permit application. It is our position at this time that the request to cull sharks is not justified.

Mahalo.

Comment on the First NWHI State Refuge Permit Application

Stephanie Fried

Congratulations to the Board and the DLNR. Overall, this is good news. This is the first time the public has ever had a glimpse into the closed process by which a small group of researchers obtains access rights to this extraordinary public trust resource. In this case, the permit application -- for 40 researchers -- requests the right to conduct daily small boat activities for a period of close to half of the year in the lagoons at Kure Atoll, Pearl and Hermes Atoll, and French Frigate Shoals, as well as other activities throughout the NWHI.

Thank you to DLNR for initiating this public process as part of the historic effort to protect this vast and fragile place. We understand that, for this first permit, the Department has been working under significant time constraints, not to mention the added strain of recent events in Kauai. These comments are submitted in a spirit of support for the state's new refuge rules and permitting guidelines.

First impressions:

- The first permit application for the new NWHI State Refuge notable for what it does say as well as what it doesn't say.

- Unfortunately, the very first permit request is for the killing of apex predators (by "baited hook, bang-stick, speargun, harpoon gun or rifle" potentially using "seal flesh" as "an acceptable part of the fishing protocol") in this apex-predator dominated ecosystem.

- There have been only very limited consultation with Native Hawaiian cultural practitioners, and no meaningful notice to the NWHI hui of `Ilio`ulaokalani Coalition, Kahea, Environmental Defense Hawai`i, Sierra Club Hawai`i which has been monitoring NWHI activities and processes for going on six years. The documentation has not been made available to the public in a timely manner. It was not posted on line the week prior to the Land Board hearing. NWHI hui members received notification of permit language less than 48 hours prior to this Land Board hearing. Clearly this is an unworkable method for achieving public comment. Our plan is to circulate the materials to a team of independent recognized scientists and cultural practitioners, early on in the process, and to make those results available to DLNR and the public. There is no way to carry this out without the early provision of materials to the public.

- We did, however, understand that this first attempt would be somewhat bumpy as new protocols are worked out.

Permitting Process

- We continue to express significant concern that there is no recognized panel of ecosystem scientists established by DLNR or consulted by them; there were no cetacean scientists consulted (apparently) – only three staff members, including "protected species coordinator" who has "no problems with any parts of any of the activities outlined in this permit", a shark

ATTACHMENT 2

expert who "had no concerns about the cetaceans work, nor with the monk seal recovery efforts." And member of Kaho`olawe Island Reserve Commission (who recommended against killing of apex predators). There is a clear need for scientific review panel of recognized ecosystem experts, with voting members also representing broad Native Hawaiian input, and conservation community representatives. The NWHI hui requests a seat at the table during the permitting review process. There is also a need for viable opportunity for public comment.

Sharks

- We note that Sol Kaho`ohalahala, one of three staff members consulted by DLNR, contacted some Kanaka Maoli marine and cultural experts, recommended strongly against the killing of sharks. He also recommended broader consultation, including with ecosystem scientists. Those who he consulted with had "no comment on the monk seal camps of cetacean work" (pg 30)

- The permit application provides data on the extent to which shark behavior has been distinctly modified in response to the small research presence, but no data are provided on the manner in which other species have responded or are likely to respond to daily small boat vessel traffic envisioned throughout the 5 month period.

- The Shark research cited seems to be dependent on a series of NMFS "draft internal" documents from 2003 – 2005 (footnote 1 on Background and Overview section for items 9 and 10), which are not provided with the paplication, making it difficult to assess the statements made.

- According to["Parrish unpublished data 2005", the EcoSim model showed "nearly imperceptible effect on the dynamics of the ecosystem" occurring as the result of the removal of 20 sharks.

- The documentation of the shark data and the "Ecopath" model provides a clear demonstration of

    - Impact of researchers on ecosystem – sharp alteration of shark behavior in response to researcher presence
    - Lack of ability of Ecopath model to predict impact of researchers on the ecosystem and adaptive behaviour of "target animals"

- Given researcher descriptions of significant researcher impact on shark behavior and therefore "dynamics of the ecosystem", this model does not appear particularly valuable for describing the NWHI or shark behavior. "Predating sharks modified their behavior patterns, so as to be more wary of human activity and gear, to a degree not anticipated when the EA was drafted." Pg 9

Environmental Assessment

An Environmental Assessment for shark culling is referred in the application to but not provided to the board or the public. This should be provided . Language requiring the submission with permit application of environmental assessments previously conducted on the proposed work should be added to the permit application form.

Seal mortality, morbidity

It is gratifying to note the attention paid by NMFS regarding the need to enhance survival of monk seal pups. The application states that "the survival of Hawaiian monk seal pups at French Frigate Shoals is compromised by Galapagos sharks" . The permit lists the following "impediments to the recovery of the Hawaiian monk seal, including adult male seal aggression, shark predation, low juvenile survival, and entanglement." Unfortunately, the applicants omit emaciation, starvation and lack of prey availability and applicants limit their attempts to aid recovery to the killing of apex predators, despite the lack of a strong theoretical framework. No mention is made by NMFS of the fact that juvenile seals are also found emaciated and starving and that lack of prey may plan an important role. It would be important to learn what measures could be taken to reduce competition for monk seal prey – including removal of bottomfish, octopus and other species from the ecosystem. Less invasive measures – i.e. reducing the removal of prey species by a fishery – instead of shooting apex predators – would follow the purposes of the state refuge as listed above.

Lack of data on other activities

- In contrast to the shark data, no data are provided on researcher impact on monk seal, cetacean, sea turtle behavior. Given the years of research, it is important to provide a detailed account of the observed impact of researchers on the target and non target organisms to date. Pg 12 of the shark background document mentions that there will be monitoring (#5 to "ensure that no seals, turtles or other species will be disturbed by the monitoring activities") Permit applicant should be required report on the impact, to date, of researchers on target and non-target organisms observed during past years of research.

- Very little data is provided on other aspects of the cetacean or monk seal camp proposed plans and plans for daily vessel traffic throughout the NWHI for a period of 5 months.

- For example, permit is being requested to perform 460 biopsies using a "biopsy dart fired from a crossbow" at a range of cetaceans including16 species of whale from Cuvier's beaker whale, pygmy sperm whale, dwarf sperm whale, minke whale and 7 species of dolphin. Unlike the shark descriptions, there is no description of potential impact on behaviour of the cetaceans – or other species in the area of this research. No references are provided regarding the potential impact of this research.

Fulfulling the Purposes of the Refuge

- The only Refuge purpose that is mentioned in this application is that of assessment of resources;: ("activities are consistent with and support the purposes of the Refuge, primarily assessment of refuge resources")The Refuge, however, also stipulates the following purposes which the applicants have failed to address and should address, in a manner that permits public comment:

Refuge Intent and purpose (excerpts):

1) To establish a marine refuge in the NWHI for the long term conservation and protection of the unique coral reef ecosystem and the related marine resources and species, to ensure their conservation and natural character for present and future generations";
2) To manage, preserve, protect, and conserve the unique resources in the marine refuge, using the best available science and a precautionary management approach to resource protection

to minimize risks of possible adverse effects on the regional ecosystem, its biodiversity or its indigenous wildlife in this area, especially where data is limited";

3) To implement an entry permit program for the area that will cause no harm t o the refuge resources and be consistent with the management programs in the adjacent National Wildlife Refuge and the NWHI CRER for this area, that preserves the area by limiting entries and restricting access to specific areas.
4) To support, promote, and coordinate appropriate scientific research and assessment, and long-term monitoring of the refuge resources, and the impacts or threats thereto from human and other activities, to help better understand, protect, and conserve consistent with applicable law;
5) To allow Native Hawaiian cultural, subsistence, and religious practices, an identification and coordination of Native Hawaiian interests, that are consistent with applicable law and the long-term conservation and protection of the resources of the marine refuge;
6) To coordinate management and process permit review [list of agencies, activities] "to ensure that they do not degrade the resources or diminish the natural character of the marine refuge;

In addition, the state's permitting guidelines stipulate that the following criteria will apply to all types of permit applications:

- "Resources and samples are a public trust
- "The activity must have demonstrable benefits to the preservation and management of the NWHI ecosystem;"
- "The activity must do no harm to the ecological or biological systems, sites or resources of the NWHI, or by virtue of the mode of transport to be employed for access."
- "The activity must have demonstrable benefits to the cultural and spiritual relationship of Native Hawaiians to the NWHI ecosystem;"
- "The activity must support the perpetuation of traditional knowledge and ancestral connections of the Native Hawaiians to the NWHI."

The permit applicant has not described the manner by which the proposed research -- including the request for permission for daily small boat traffic – will meet the above purposes and permitting guidelines.

Daily small boat operations

The applicant states that

- "Boat operations will occur virtually daily for the duration of the project at Pearl and Hermes Atoll and French Frigate Shoals, and approximately every third day at Kure Atoll."
- "Extensive small boat operations will occur within the lagoons at Kure Atoll, Pearl and Hermes atoll, and French Frigate Shoals as part of monk seal monitoring." (Permit application form)
- Permit application section 9 (Purpose/Need/Scope) presents "small boat operations" as required to support seal and turtle monitoring. However, no impact assessment of the proposed daily small boat traffic on target and non-target species is provided.
- The permit application states that "No summary of small boat operations will be prepared" [item 20, permit application]

- Given the high level of traffic and the refuge requirements for the protection of this public trust resource, it would be important to have a detailed account of small boat operations and their impacts
- What are the potential impacts of researcher presence and vessel traffic on species, including Hawaiian monk seals, cetaceans, and other species? What impacts have been observed in past years?
- The Kaho`olawe Island Reserve Commission representative, Sol Kaho`ohalahala, contacted by the DLNR who, in turn, contacted some marine and cultural experts raised numerous, serious questions not only about shark culling, but also about simulated modeling cited (i.e. the "Ecopath" model) which the applicants assert indicate that the culling of Galapagos sharks "will have no impact on the ecosystem". His submission to DLNR staff asked, "How can they say 'no effect' when you remove an apex predator in an apex predator dominated ecosystem?"

- Forty personnel are listed on the permit application for this research. They include Robert Dollar (although a note is made that his resume has not been provided with the application). From the permit application it is not specified what role he will play in the research effort. In addition 10 personnel associated with "Aquatic Farms, Ltd" are listed on the application. No clarification is made regarding the role of Aquatic Farms Limited in this research. What is Aquatic Farms Ltd?

- No resumes are attached to the public version of this permit application, despite having been submitted as part of the application, meaning that the public are provided no information on the background, training and experience of those requesting access to this public trust resource. We request access to all documents submitted as part of the application process.

Alien/Invasive Species Inpsections:

Only evidence of hull monitoring is provided for the Oscar Sette research vessel "while underway south of American Samoa" on Feb 15, 2006. This is a nice start, but:

1) the research begins in April, and the vessel should be inspected just prior to leaving for the NWHI, from Honolulu
2) the 135,000 gallons ballast water has not been inspected. In the case of a shipwreck or other event, this could prove a dangerous oversight.
3) neither have the 3 tender vessels, nor gear/equipment been inspected. There is mention of additional workboats at each site – Kure 20 foot whaler; Pearl ahnd Hermes two 20 ft whalers, French Frigate Shoals, two 20 foot whalers, but there is no record of inspection of any of these vessels.

Recommendation: require inspections for all vessels, ballast water, equipment just prior to departure for NWHI.

Wastewater

Oscar Sette has a 6000 gallon tank for grey and black water.

No description is provided how often and where the tank will be emptied, given the presence of up to 40 researchers. Description is needed.

Night time light protocol

The permit application (number 21) indicates that the vessel has no such protocol, a concern for avoiding impacts by birds attracted to lights. Need to develop, describe to board, and implement a protocol.

Recommended additions to permit application form:

- Are you seeking any additional permits? Please list all permits sought and conditions sought for those permits. (for example, a Sanctuary permit conditioned to allow "moving, removing, taking" of organisms would be listed).
- Have any Environmental Assessments, Environmental Impact Statements, or similar evaluations been conducted for all or part of your work? If so, please provide copies of any such assessments with this application.
- Please describe the plan for the frequency and location of waste disposal for all wastes.

Summary and Recommendations from meeting concerning NWHI State Refuge shark culling permit on Thursday May 4, 2006

On Thursday May 4, 2006 at 10:00 p.m. to 1:00 p.m. a small advisory group made up of representatives from Kaho'olawe Island Reserve Commission (Sol Kaho'ohalahala, Kathy Kaohu, Dean Tokishi, Kapono'ai Molitau, and Kanekoa Kukea-Shultz), Office of Hawaiian Affairs (Heidi Guth), and the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve (Moani Pai and Kekuewa Kikiloi) met at the KIRC office on Maui to discuss the State NWHI Refuge permit application by NMFS concerning shark culling at FFS.

At this meeting significant issues and concerns were raised by the Native Hawaiian which makes it difficult to support the shark culling permit at this time. These are some of the concerns raised in discussion:

1) Following the State Refuge Rules and Permitting Guidelines

According to the State of Hawai'i Department of Land and Natural Resources (DLNR) "Guidelines for Submitting Permit Applications for Access to the Northwestern Hawaiian Islands State Marine Refuge" and State Refuge Rules (Hawaii Administrative Rules, Title 13, Subtitle 4, Part 11, Chapter 60.5), the purpose of establishing the Refuge was "for the long-term conservation and protection of the unique coral reef ecosystems and the related marine resources and species, to ensure their conservation and natural character for present and future generations." (HAR § 13-60.5-1(1)) While protecting the resources of this Refuge, DLNR intends "[t]o implement an entry permit program for the area that will cause no harm to the refuge resources." (HAR § 13-60.5-1(3))

Likewise, the language in the Permitting Guidelines shows great foresight, understanding and compassion for the invaluable cultural and natural resources of the NWHI. The Guidelines list specific criteria that shall "apply to **all** types of permit applications." (emphasis in original) Thus, the six, listed criteria must be met by each of the three possible types of permit applications: scientific research and education, Native Hawaiian traditional and/or customary practices, and special activities. The criteria emphasize the need not just for consideration of potential Native Hawaiian concerns by the applicant, but a requirement for Native Hawaiian cultural benefits from the applicant's access. Thus, not only scientific best practices are required, hut so are Native Hawaiian best practices.

While Native Hawaiian interests and knowledge are woven throughout the six criteria, two of the criteria, which are not met in the shark culling application, this provides cause for denial of this application until the applicant has done enough research to answer such questions as we list below. The criteria also provide cause to remind us of the importance of utilizing the NWHI State Refuge Native Hawaiian Cultural Working Group, which could advise applicants on how to satisfy all of the criteria and how to identify clear Native Hawaiian knowledge authorities for specific applications. We appreciate the

inclusion of the following criteria in the Guidelines, and respectfully remind DLNR staff to apply them:

- The activity **must** have demonstrable benefits to the cultural and spiritual relationship of Native Hawaiians to the Northwestern Hawaiian Islands ecosystem;
- The activity **must** support the perpetuation of traditional knowledge and ancestral connections of the Native Hawaiians to the Northwestern Hawaiian Islands. (emphasis added)

2) Larger issues not addressed:

From the information provided at the presentation, it appears that there is only an inferred link between shark predation and monk seal pup population decline. Other larger issues concerning monk seal pup populations have not been fully addressed. According to the presentation, the "learned behavior" of predation by Galapagos sharks at FFS has evolved from a specific environmental context. Until this context is addressed, the problem will not go away. The culling of sharks is only an immediate short term solution to a larger long-term problem. Our group suggests that focus be redirected on saving the Hawaiian monk seal instead of killing the Galapagos sharks. Other options that have not been fully explored are: trans-relocation of Hawaiian monk seals to enhance female reproductive potential, habitat restoration, and the possibility of closing the dredged channel.

The following cultural issues and concerns were brought up during discussion:

- How does this application demonstrate a cultural understanding of the environment — has the applicant addressed which deities are involved?
- What types of cultural practices are involved here- what are the cultural practices concerning the killing of sharks? What types of loina kupuna (prayers, protocols, offerings, and traditions) are practiced in these situations?
- How is the perpetuation of traditional knowledge ('ikena Hawai'i) addressed in this application? Would the applicant be open to using traditional cultural practices to kill the shark? Flow is cultural appropriateness (pono) addressed in this application?
- What is the cultural meaning of signs (ho'ailona) that are happening in the physical and natural environment?

Important Recommendations:

In order to adequately satisfy the criteria highlighted in the permitting process, we recommend the following:

- Following Bud Antonelis's suggestion on the April 24th meeting, we support the incorporation of Native Hawaiian cultural practitioners and experts to be partners on the Hawaiian Monk Seal Recovery Team. Also, incorporating Hawaiian

cultural expertise and/or a liaison to the Hawaiian community should be a priority for the NMFS agency.

- Pertaining to shark culling- any sharks that are selectively killed should follow Hawaiian cultural protocols of taking and gathering natural resources. The NWHI State Refuge cultural working group should provide guidance on how this can be accomplished in a culturally appropriate manner. If cultural practitioners / experts are incorporated into the Hawaiian Monk Seal Recovery Team / NMFS then they could also provide needed assistance in accomplishing this goal.

- All natural resources permitted on research applications should serve the dual purpose of meeting the needs of scientific research and use for the perpetuation of cultural practices.

- The NWHI State Refuge should incorporate a larger representative body of the Native Hawaiian community to review permits. This can be accomplished by reconvening the original Native Hawaiian cultural working group that met on DATE, to give initial input on the State Refuge Permitting Guidelines as it was being developed. We feel that this cultural working group represents a wide range of expertise (cultural practitioners, scholars, cultural resource managers, language specialists) from the cultural community that can help in determining the appropriateness of permits in satisfying the outlined criteria. By utilizing the expertise of this cultural working group in the State Refuge permitting process the applicant would have clearer direction on how to satisfy these criteria.

APPENDIX 1

State of Hawai'i
DLNR
Northwestern Hawaiian Islands State Marine Refuge
Permit Application Form
Draft

For Office Use Only
Permit No:
Expiration date:
Date Appl. Received: 5-31-2006
Appl. Fee received: N/A
NWHI Permit Review Committee date:
Board Hearing date:
Post to web date:

Type of Permit

☒ I am applying for a **Research, Monitoring & Education** permit. (Complete and mail Application)
- ☒ This application is for a NEW project in the State Marine Refuge.
- ☐ This application is for an ANNUAL RENEWAL of a previously permitted project in the State Marine Refuge.

☐ I am applying for a permit for a **Native Hawaiian** permit. (Complete and mail Application)
- ☐ This application is for a NEW project in the State Marine Refuge.
- ☐ This application is for an ANNUAL RENEWAL of a previously permitted project in the State Marine Refuge.

☐ I am applying for a **Special Activity** permit. (Complete and mail Application)
- ☐ This application is for a NEW project in the State Marine Refuge.
- ☐ This application is for an ANNUAL RENEWAL of a previously permitted project in the State Marine Refuge.

Briefly describe **Special permit** activity:

When will the NWHI activity take place?

☒ **Summer** (May-July of __2006___ (year)
Note: Permit request must be received before February 1st
Specific dates of expedition ___~April 6, 2006 through ~September 15, 2006___

☐ **Fall** (August-November) of _2006___ (year)
Note: Permit request must be received before May 1st
Specific dates of expedition ___~April 6, 2006 through ~September 15, 2006____

☐ **Other**

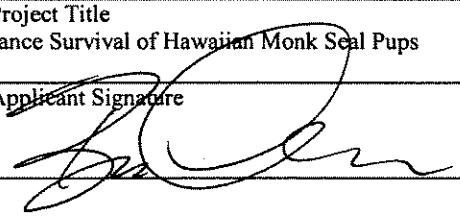
NOTE: INCOMPLETE APPLICATIONS WILL NOT BE ACCEPTED

Please Send Permit Applications to:

NWHI State Marine Refuge Permit Coordinator
State of Hawai'i
Department of Land and Natural Resources
Division of Aquatic Resources
1151 Punchbowl Street, Room 330
Honolulu, Hawai'i 96813

NWHI State Marine Refuge Permit Application
See Appendix 2 for Application Instructions

Section A – Applicant Information

1. Project Leader (attach Project Leader's CV or resume) ☐ CV attached Antonelis, George A. (Bud) Name: Last, First, Middle Initial	 Chief, Protected Species Division (PSD) Title
2. Mailing Address (Street/PO Box, City, State, Zip) 2570 Dole St. Honolulu, HI 96822	Telephone (808) 983-5710 Fax (808) 983-2902 Email Address bud.antonelis@noaa.gov
3. Affiliation (Institution/Agency/Organization) Pacific Islands Fisheries Science Center (PIFSC) National Marine Fisheries Service	For graduate students, Major Professor 's Name & Telephone
4. Sub-Permittee/Assistant Names, Affiliations, and Contact Information ☐ CV or resume attached Following personnel affiliated with Research Corporation of the University of Hawaii: Suzanne Canja. Following personnel affiliated with Aquatic Farms, Ltd.: Elaine Leung and Megan McKinzie. Private contractors include: Robert Braun, DVM, Aaron Dietrich, Dan Luers, and a Hawaiian practitioner TBN.	
5. Project Title Enhance Survival of Hawaiian Monk Seal Pups	
6. Applicant Signature 	7. Date (mm/dd/yyyy) 05/31/2006

Section B: Project Information

8. **(a) Project Location**

☒ NWHI State Marine Refuge (0-3 miles) waters surrounding:

- ☐ Nihoa Island
- ☐ Necker Island (Mokumanamana)
- ☒ French Frigate Shoals
- ☐ Laysan
- ☐ Maro
- ☐ Gardner Pinnacles
- ☐ Lisianski Island, Neva Shoal
- ☐ Pearl and Hermes Atoll
- ☐ Kure Atoll, State Wildlife Refuge
- ☐ Other NWHI location

Describe project location (include names, GPS coordinates, habitats, depths and attach maps, etc. as appropriate).

Activity will occur in the nearshore waters of within French Frigate Shoals, primarily in the vicinity of Trig Island.

(b) check all actions to be authorized:

☒ Enter the NWHI Marine Refuge waters

☐ Take (harvest) ☐ Possess ☐ Transport (☐ Inter-island ☐ Out-of-state)

☒ Catch ☒ Kill ☒ Disturb ☒ Observe

☒ Anchor ☒ Land (go ashore) ☐ Archaeological research

☒ Interactions with Sea Turtles or Monk Seals ☒ Interactions with Seabirds

☐ Interactions with Live Coral, Ark Shells or Pearl Oysters

☒ Interactions with Jacks, Grouper or Sharks

☒ Conduct Native Hawaiian religious and/or cultural activities

☐ Other activities _____

(c) Collection of specimens – collecting activities (would apply to any activity):

Organisms or objects (List of species, if applicable, add additional sheets if necessary):

Common name	Scientific name	No. & size of specimens	Collection Location(s)
Galapagos Shark	Carcharhinus galapagensis	15 individuals, adults	French Frigate Shoals

(d) What will be done with the specimens after the project has ended?

Stomach contents, liver sample, and muscle sample will be retained from sharks for tissue analysis; teeth and ventral (belly) skin of sharks will be retained for cultural use; remainder of shark carcass will be discarded.

(e) Will the organisms be kept alive after collection? ☐ yes ☒ no

- Specific site/location _____
- Is it an open or closed system? ☐ open ☐ closed
- Is there an outfall? ☐ yes ☐ no
- Will these organisms be housed with other organisms? If so, what are the other organisms?

(Please attach additional documentation as needed to complete the questions listed below)

9. Purpose/Need/Scope:

- State purpose of proposed activities:

Purpose is to enhance the survival of Hawaiian monk seal pups by conducting observations of shark behavior, and experimentally removing Galapagos sharks which are observed displaying predatory behavior towards monk seal pups.

Describe how your proposed activities will help provide information or resources to fulfill the State Marine Refuge purpose and to reach the Refuge goals and objectives.

The proposed activities are consistent with and support the purposes of the Refuge as directed by the Department, specifically §13-60 5.1 (4) "To support, promote, and coordinate appropriate scientific research and assessment, and long-term monitoring of the refuge resources, and the impacts or threats thereto from human and other activities, to help better understand, protect, manage, and conserve consistent with applicable law." and §13-60 5.1 (5) "To allow Native Hawaiian cultural, subsistence, and religious practices, and identification and coordination of Native Hawaiian interests, that are consistent with applicable law and

the long-term conservation and protection of the resources of the marine refuge."

- Give reasons why this activity must take place in the NWHI and cannot take place in the Main Hawaiian Islands, or elsewhere.

As described below, survival of Hawaiian monk seal pups at French Frigate Shoals is compromised by Galapagos sharks. These events have only been documented at French Frigate Shoals, and therefore efforts to mitigate against Galapagos shark predation must occur there.

- Describe context of this activity, include history of the science for these questions and background.

Background and Overview

Predation on Hawaiian monk seals by large sharks has been well documented in several reports (Kenyon and Rice 1959, Balazs and Whittow 1979, Rice 1964, Alcorn and Kam 1986). The actual act of predation by sharks on Hawaiian monk seals is rarely observed, and frequently researchers have only been able to assess bite wounds or scars from shark attacks (Hiruki et al. 1993). While shark predation has been a known mortality source for many decades, until recently, it was not identified as a major limiting factor in any monk seal subpopulation.

Recent studies have shown that shark predation has been a significant factor contributing to early pup mortality at FFS, particularly at Trig Island. A significant number of pup deaths or disappearances related to shark predation have been either directly observed or inferred from previous events associated with shark predation on pups. Two factors are considered when inferring the occurrence of shark predation, and distinguishing predation losses from those attributable to other factors, most notably aggressive males. The first is that females intensely defend their pups from adult males during lactation (Johanos et al. 1994); the second is that males inflict distinctive scars and lacerations (Hiruki et al. 1993). Therefore, shark predation is inferred when unweaned pups disappear and there is no evidence of male interaction or other factors likely to compromise pup survival (such as severe storms). Most mortality or injury from sharks involves nursing pups, but analysis of historical data indicates that weaned pups are also attacked.

Research initiated in 1997-1998 indicated that Galapagos shark (Carcharhinus galapagensis) was the shark species responsible for the escalation in predation losses at Trig Island. In 1998, a number of individually identified Galapagos sharks patrolled Trig Island repeatedly within the same season, and exhibited distinct predatory behavior. Although Galapagos sharks have been previously reported to prey on pinnipeds, (Compagno 1984), they most commonly forage on fish and cephalopods (Compagno 1984, Wetherbee et al. 1996), and predation on Hawaiian monk seals was not documented prior to 1997 (Craig et al. 1999). Predation losses remained high from 1997-99, but declined after an active research presence was established at Trig Island in 2000. In 2000-2004, Galapagos sharks remained the only species identified attempting to prey on pre-weaned monk seal pups in shallow water, <2 m in depth, at Trig Island. Observational studies, bite radii, and teeth spacing of shark injuries to pre-weaned pups also indicate that the preponderance of pup wounds were inflicted by Galapagos sharks. However, we suspect that at least some of the recent pup disappearances at East Island may be attributable to tiger sharks, which frequently prey on fledgling albatross.

This pattern of intense shark predation is exceptional. Over two decades of monk seal studies indicate that Galapagos shark predation on pre-weaned pups is a very unusual behavior that is unique to Trig Island and, more recently, other sites at French Frigate Shoals. It is not a known cause of pre-weaned pup mortality at other monk seal reproductive sites in the NWHI. We believe that a small group of Galapagos sharks frequenting Trig I and possibly now ranging atoll-wide, has learned to prey on pre-weaned monk seal pups and is responsible for most of the predation.

The escalation of Galapagos shark predation on pre-weaned pups may be related to a period of adult male monk seal aggression that resulted in several pup deaths at Trig Island. Pup carcasses remaining in the surrounding waters of Trig I. after adult male interactions may have attracted the Galapagos sharks to a new prey resource, which led to the recently observed predation problem. Male aggression at Trig I. was a significant cause of pup mortality in 1997 and was mitigated in 1998, but Galapagos sharks have continued to target pre-weaned monk seal

pups as prey.

Previous efforts have been made to prevent shark predation at Trig I. by non-lethal means. In 2000, studies were initiated to document the occurrence of Galapagos shark predation on pups and to deter predation by hazing (jabbing with long pole while attempting to tag, throwing pieces of dead coral and other debris found on beach) sharks frequenting water <2 m in depth. The 2000 study served as a pilot investigation, the study was refined in 2001, and data collection was fully implemented in 2002-2003. In 2004-2005, the intensive shark monitoring conducted at Trig in 2000-2003 was suspended in favor of more broad-scale investigations atoll-wide.

Given the information obtained over the last nine years (1997-2005), it is possible that shark predation on Hawaiian monk seal pups at French Frigate Shoals will escalate if efforts to mitigate the problem do not continue. An example of such a problem occurred at Sable Island, Canada where harbor seal (Phoca vitulina) pup survival declined from over 600 to 40 within a nine year period as a result of shark predation (Lucas and Stobo 2000).

Summary of Long-Term Shark Predation Trends at FFS

For purposes of data compilation and analysis of historical data, possible predation incidents are divided into three classes:

- Confirmed mortalities or attacks (carcass or pup observed with shark inflicted wounds)
- Probable mortalities (confirmed mortalities + pup disappearances preceded by observed shark-inflicted wounds)
- Possible mortalities or attacks (both of above categories + disappearances inferred to be predation due to absence of any other compromising factors)

Using these categories, the dynamics of the shark predation phenomenon at FFS (1997-2005) can be summarized as follows:

- At Trig/Whaleskate, the number of possible mortalities (recall that possible includes both observed injuries and inferred losses) peaked in 1997-1999 (18-28 possible mortalities each year) and declined thereafter (less than 10 possible mortalities each year). There were 3-4 possible mortalities in 2002-2004, and 6 in 2005.

- The proportion of pups born at Trig/Whaleskate that were possible attack victims also peaked in 1997-99 (38-69% of the annual cohort). The proportion attacked was less than 20% from 2002-2004, but increased to 29% in 2005 (Figure 1 attached).

- The number of attack incidents elsewhere in the atoll has increased from less than 10% of pups born at non-Trig sites attacked in 1997-99, to approximately 17-18% of the annual cohort in 2000-2002, 31% in 2003-2004, and back to 18% in 2005 (value are possible attacks which includes confirmed injuries and kills plus inferred predation losses).

- Atoll-wide, the number of possible mortalities has been more-or-less stable the last five years, with 10-12 losses each year (10 in 2005). These losses account for 15-21% of the annual cohort born at FFS (19% in 2005). The number of possible shark attacks (lethal and non-lethal) atoll-wide has ranged from 23-30% of the annual cohort since 2000 (23% in 2005).

In the subsequent sections, these trends are described in greater detail for Trig Island and the rest of FFS, respectively.

Summary of 2005 Predation Events at FFS

There were a total of 52 pups born at FFS in 2005, of which 10 (19%) were believed to be victims of shark predation. Another 4 pups disappeared due to unknown causes: those losses may have been due to shark predation, but evidence was inconclusive to attribute the losses to shark predation. If those 4 pups are treated as shark-related mortalities, the total cohort loss becomes 27%.

The 10 losses attributed to shark predation in 2005 included the following incidents:

- Trig Island (24 born; 6 mortalities): 1 confirmed kills, 3 shark-inferred disappearance, and 2 wounding with subsequent disappearance
- Round Island (2 born; 1 mortality): 1 shark-inferred disappearance
- Gin Island (1 born; 2 mortalities): 1 kill and 1 shark-inferred disappearance
- Shark Island (1 born 1 mortality): 1 shark-inferred disappearance

Predation rates and trends at Trig Island (all years)

At Trig Island, both the number of shark attacks and number of mortalities peaked in 1997-1999 and declined thereafter, but has been increasing since 2002 (Figures 1-2 attached). The high of 28 possible mortalities in 1997 (Figure 1) differs from some previous tabulations because the earlier analyses failed to include older nursing and near-weaning losses as possible shark mortalities. The intensive observational data from the last five years has led to the recognition that older pups are vulnerable to shark predation, and hence they are included here as possible shark mortalities.

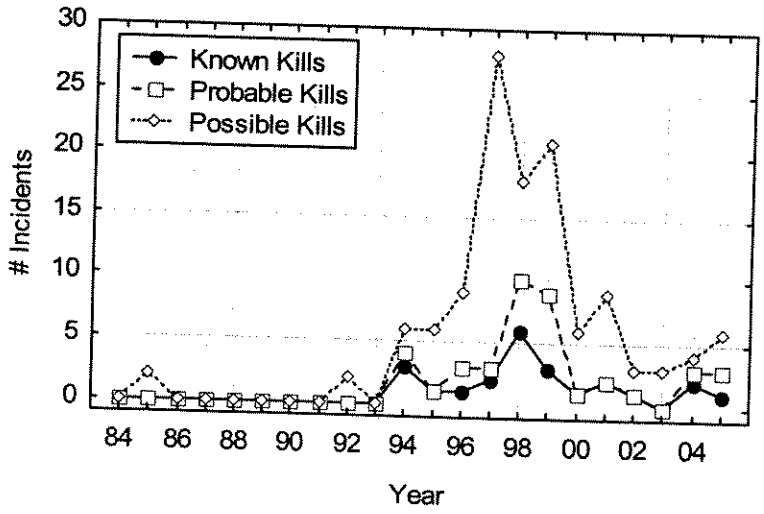


Figure 1. Shark mortalities (known and inferred) at Trig and Whaleskate Islands, 1984-2005. (see text for description of the known, probable, and possible mortalities).

The raw numbers of pups attacked or killed may be misleading because the total number of pups born at the Trig/Whaleskate complex has declined in the last six years (Figure 1). If the predation data are interpreted in relation to the number of pups born at the two islands, it is apparent that although the predation rate has declined after 1999, the proportion of the annual cohort lost to predation has been edged upward each year from 2002-2005 (Figure 2).

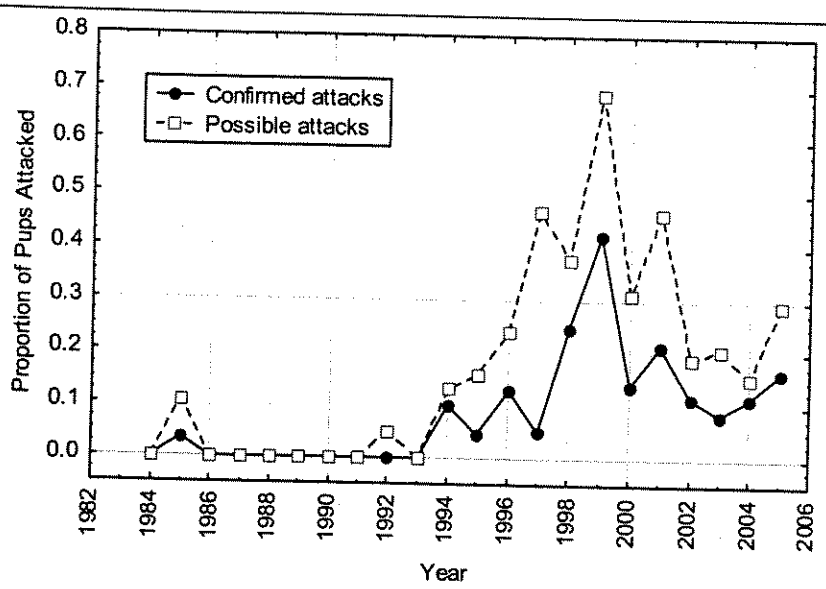


Figure 2. Proportion of pups born at Trig and Whaleskate attacked by sharks (confirmed kills/injuries and inferred kills from unexplained disappearances), 1984-2005.

Prior to 2000, predatory sharks were commonly observed at Trig Island during daylight hours. Since an active research presence was established on Trig Island in 2000 (combined with shark removals and various levels of shark harassment), the shark sighting rate has markedly declined and shark predatory behavior is now largely nocturnal. The fact that the population continues to suffer predation losses, although Galapagos shark sightings are generally low, indicates that the predatory activity is now confined primarily to crepuscular and/or nocturnal hours, when researchers are not present.

Atoll-wide, shark attacks and mortalities have declined since the peak in 1997-99 (Figure 3). However, as predation has decreased at Trig Island (Figures 1-2), it has tended to increase at the other sites (Figure 4-5) so that Trig Island now accounts for a smaller proportion of the total (atoll-wide) predation documented each year. Most of the apparent increase belongs in the "shark-inferred" category (a component of the possible mortalities/attacks as displayed in the figures: unexplained pup disappearances with no indication of other compromising factors). With fewer numbers of pups being born at FFS (as compared to the peak in the late-1990s), the predation is taking a heavy toll on a smaller cohort: approximately 24% of the 2004 cohort was attacked, with 18% of the cohort believed lost to shark predation (Figure 6 attached). Clearly, the apparent metastasis of shark predation from a localized phenomenon at Trig to an atoll-wide issue is of grave concern to the conservation of monk seals at French Frigate Shoals.

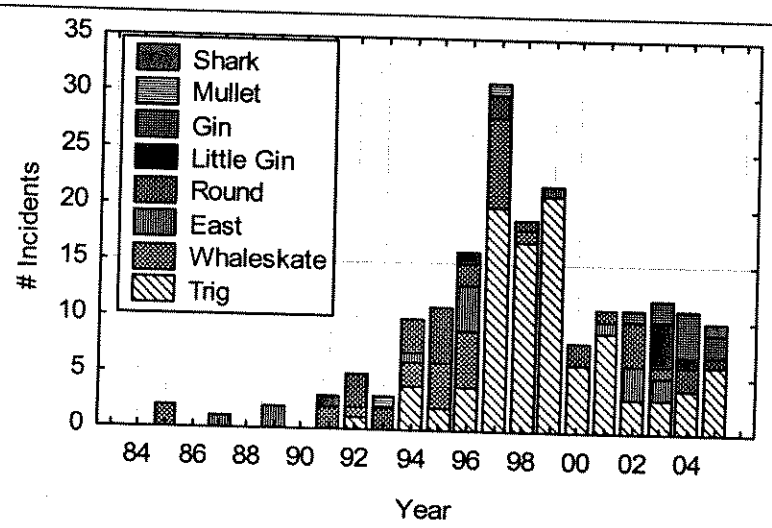


Figure 3. Number of possible mortalities atoll-wide at FFS, 1984-2005

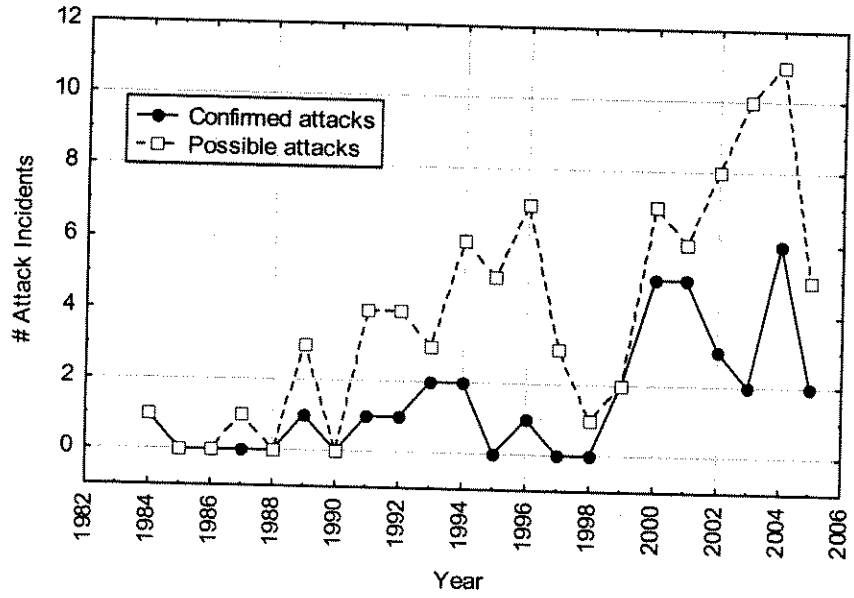


Figure 4. Number of attacks at all FFS sites except Trig/Whaleskate, 1984-2005

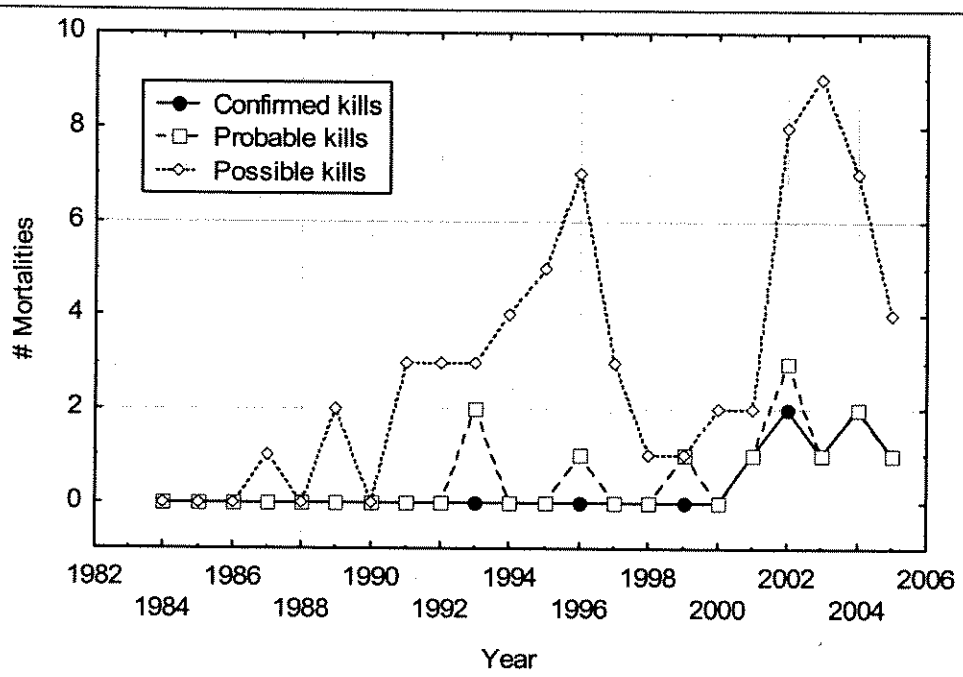


Figure 5. Number of predation mortalities at all FFS sites except Trig/Whaleskate, 1984-2005

Previous Experimental Efforts Related to Shark Predation

A number of strategies and techniques have been attempted to reduce the vulnerability of monk seal pups to predatory Galapagos sharks. Irregular shark observations were incidentally conducted in 1998-1999 by members of the monk seal population assessment team. Activities included non-standardized observations and limited tagging of individual Galapagos sharks in 1999 (Craig et al. 1999).

Beginning in 2000 (and continuing through 2003), standardized protocols for shark monitoring were implemented at Trig Island, and the removal of Galapagos sharks engaged in predatory behavior was authorized. Intentional hazing of Galapagos sharks at Trig I. in 2000 and 2001 did not eliminate predation on pre-weaned pups, but did cause sharks to become extremely wary of human presence. No hazing was conducted in 2002-2004 in favor of a less obtrusive research presence. Results from the monitoring project indicate a substantial reduction in shark density at Trig Island from 2000-2005, although each year a number of pups are victims of inferred shark predation (see previous discussion of predation trends). The fact that the population continues to suffer predation losses, although Galapagos shark sightings are generally low, suggests that the predatory activity is now confined primarily to crepuscular and/or nocturnal hours, when researchers are not present. This activity pattern is unlike that observed in 1998-99 when sharks were frequently observed engaged in predatory behaviors during daylight hours (Antonelis pers. comm.).

From 2000-2005, 12 Galapagos sharks have been removed from Trig Island using conventional hand line and a hand-held harpoon (2000: 1 shark; 2001: 5 sharks; 2002: 2 sharks; 2003: 2 sharks; 2004: 0 sharks; 2005: 2 sharks). All fishing efforts in 2005 were conducted at Trig Island, although in previous years, limited fishing was conducted at Round Island. One of the two sharks taken in 2005 was taken with a harpoon, and the other using a hand-line.

Non-lethal deterrents such as nets, bubble nets, electromagnetic fields, physical barriers, and relocation have been considered, but they pose a threat to monk seals (e.g., entanglement) and/or would displace of Galapagos sharks to other locations where they might initiate their predatory behavior at new sites (harassment would have the same effect as exclusion) and potentially amplify the problem over time. Also, we have concern that these deterrents (e.g., electromagnetic fields) would unnecessarily displace other sharks such as gray reef sharks, which are not engaged in predatory behavior. Possible restoration of monk seal pupping habitat continues to be explored as it may help spread parturient females and their pups throughout the Atoll and thus minimize the possibility of a shark predation "hot spot".

- Explain the need for this activity and how it will help to enhance survival or recovery of refuge wildlife and habitats.

An Environmental Assessment for the proposed experimental removal of Galapagos sharks at Trig Island was completed in 2002 (NMFS 2002). A memorandum documenting the need to extend the duration of the study and the EA has been prepared and is attached. The preferred alternative identified in that document included the experimental removal of Galapagos sharks exhibiting predatory behavior toward monk seal pups at Trig Island The project was expanded in 2003 to allow shark monitoring and removal at other sites in French Frigate Shoals where Galapagos shark predation had been observed. The spread of the predation to other sites was anticipated as the ongoing removal efforts at Trig caused the sharks to alter their behavior (see 2004 and 2005 SUP Reports). The positive results obtained at Trig Island from 2000-2003 suggested that, if applied atoll-wide, the same methodology could be instrumental in improving the survival of monk seal pups at other sites, and was a required component of monk seal conservation at FFS. The atoll-wide initiative was formalized with the 2003 addition of Round Island and Whale-Skate Islands to the Trig Island study . Possible effects of the atoll-wide removal program on the coral reef ecosystem at FFS were investigated using the EcoSim model. Results from that work indicated that the removal of 20 sharks (the initial number permitted in the EA) had a nearly imperceptible effect on the dynamics of the ecosystem (Parrish unpublished data 2005).

Under the terms of the EA and ancillary agreements, only Galapagos sharks displaying active predatory behavior to pre-weaned seals can be targeted for removal. Sharks of other species (tiger sharks, gray reef sharks, and others), and Galapagos sharks not engaged in apparent predatory interactions with monk seal pups may not be removed. Criteria for assessing predatory behavior are given in the Methodology section of this application.

The working hypothesis around which the preferred alternative in the EA was designed was that the pool of actively predating Galapagos sharks was small (relative to their total population size), and swift removal of up to 40 sharks in one to two seasons would deplete their numbers and successfully alleviate the predation crisis. The removals were designed as an "experiment" in the sense that the removals would be conducted in association with intensive monitoring and research on shark numbers, behavior, and movements, thereby enabling a quantitative assessment of the project's success.

The project has not proceeded as originally conceived, due largely to the fact that predating sharks modified their behavior patterns, so as to be more wary of human activity and gear, to a degree not anticipated when the EA was drafted. Despite the intensive fishing effort by highly skilled personnel, less than one-third of the 40 sharks stipulated in the EA have been removed over a longer time period. The project, as realized, incorporates elements of both Alternatives 1 (removals) and 2 (harassment) of the EA, with the latter element largely an artifact of inefficient removal methods (see below). Nonetheless, the reduction in predation losses at Trig Island (50-70% as compared to the 1997-1999 levels) is likely a result, in whole or in part, of the ongoing shark removals and the harassment that accompanies shark observation and fishing. However, with the current removal protocols, the program is more likely to moderate rather than alleviate predation intensity. If efforts are not made to become more efficient at removal, then the experiment will be more difficult to assess because it becomes more like an ongoing "maintenance" effort for monk seal conservation at FFS, rather than an intensive short-term mitigation measure.

The remaining Galapagos sharks engaged in monk seal predation respond to human activity by avoiding, or being extremely cautions in areas where humans are present. In response to these changes in shark behavior, several capture methods have been attempted with varying levels of success. These include hand-line fishing, hand-held harpoon, and a spear gun. The primary capture method to date, and the only available method of take for sharks beyond 5 meters of shore (but still within the permitted depth of < 2m) is fishing from shore with a hand-line. As sharks have become increasingly wary of human activity at Trig Island, this method is rendered extremely inefficient. The speargun and harpoon are also inefficient because the sharks are extremely wary of humans and remain out of range.

The efficiency of the current shark removal protocols was evaluated through a simple catch-per-effort analysis compiled from the shark observation and capture data. A total of 10 sharks have been hooked over 6 field seasons using the "hook and line technique". Of these sharks, 8 have been culled and one was hooked and lost. These numbers include five sharks from 2001, four of which were captured after seal flesh was added as an acceptable part of the fishing protocol. In spite of a substantial increase in observation and fishing effort since

2001, only three sharks have been captured by a baited hook and line. The effort expended includes over 2,470 hours of observation time dedicated solely to monitoring shark predatory behavior.

No more than two sharks were taken in any year except 2001, when five sharks were removed. Project biologists have noted that the sharks have become increasingly cautious when approaching the baited hook: Although the fishing effort in 2005 was the highest since the project began, few sharks showed even passing interest in either seal or fish bait. The one shark that was captured was hooked on the placenta of a seal born that morning, suggesting a strong preference for extremely fresh, unfrozen seal flesh. Unfortunately, this "ultra" fresh bait is only available when a pup has been born in the past two hours. Freezing and handling of seal tissue by humans likely imparts an odor that the sharks can detect and illustrates the need for a new method of capture.

As further indication of the extent to which sharks have become more cautious over the life of the project, ,there have been no confirmed injuries on any seals during observation hours since 2001, despite the considerable observation effort expended from 2002-2005. This suggests that sharks now hunt differently, and perhaps more aggressively, during times when human are not present. These findings reinforce the need for a more effective shark removal strategy to achieve the project objective to mitigate predation losses as outlined in the EA.

- Describe how your proposed project can help to better manage the State Marine Refuge.

  Accurate information on abundance, distribution, and factors affecting survival of Hawaiian monk seals is necessary to assess possible impacts of any management action within the Refuge, as mandated by NEPA and ESA. The State NWHI Marine Refuge, as steward for the islands, should have an accurate and thorough dataset of endangered and threatened species that utilize the region in order to protect these populations. The project to enhance survival of monk seal pups provides an effective mechanism for managing a predator which is threatening the continued presence of an endangered species subpopulation within the Refuge. Since the project started in 2000, the number of deaths and injuries to monk seals on Trig Island attributable to Galapagos sharks has diminished. Moreover, management of Galapagos sharks by selective removal of only a few individuals will not perturb the refuge ecosystem, as determined by the Ecosim model.

10. Procedures (include equipment/materials)

In the Methods which follow, certain additions to the 2003-2005 protocols are proposed to better adapt the study design to the increased predation at non-Trig sites, and the nocturnal predation pattern at all sites. New provisions proposed for implementation in 2006 include the remote monitoring system on Trig and possibly one other site (Item 5), and the option to use a small caliber charged harpoon gun for more effective shark removal (item 14).

A. Shark Monitoring and Shark Fishing

1. Time-scan sampling: As in 2004-2005, the regimen of intense shark observations (i.e., time-scan sampling) undertaken at Trig Island in 2000-2003 will be not be undertaken in 2006 in favor of the more mobile shark predation response effort (see below). Limited time-scan sampling will be conducted, using the established protocols, under the following conditions: 1) a major recrudescence of shark activity at Trig Island occurs (as detected by excessive pup losses or direct observations of patrolling sharks), 2) personnel are available to conduct the observations, and 3) determination by NMFS that significant new findings (in terms of our understanding of the shark/seal dynamic) are likely to accrue from an intensified shark monitoring effort.

2. Overnight camping: Should the level of shark activity or predation losses increase at Trig Island, East Island, or the Gins, NMFS staff may request permission from USFWS for overnight camping (multiple nights may be necesary) in order to collect information during dawn/dusk periods. During overnight observations, the shark monitoring team may employ night-vision goggles to enable observations in low-light conditions (nocturnal and pre-dawn hours).

3. Pre-dawn fishing: As per the agreement with USFWS in 2005, pre-dawn fishing will be allowed when the shark team overnights at

a site. This time period is specified because of the additional safety afforded by increasing (rather than waning) light, and the option for additional boat support (as required) during approved Refuge boating hours. Optionally, predating sharks may be harpooned from shore, using floats to facilitate relocation and removal of the shark.

4. Trig Island Monitoring: Monk seal population assessment personnel will continue to visit Trig Island on a daily or near-daily basis so that missing pups, shark-injured pups, or elevated shark activity will be immediately detected. If sharks are observed, monitoring intensity will be immediately increased to evaluate the predation risk (see item 6).

5. Remote Monitoring System: Recent trends indicate that most predation activity now occurs when observers are not present at a site. This is apparently occurring due to shark displacement when personnel arrive by boat (or are otherwise visible to sharks), and/or because most predation is now happening at night. NMFS is currently investigating the use of remotely-operated camera systems, similar to that now in use on East Island for green sea turtle research, for monitoring shark activity and pup status on major FFS pupping sites. The most likely location for the system is Trig Island, but other sites where predation has been documented or is suspected may also be considered. Depending on the level of predation detected, one of the Gin Islands would be the most likely site for an additional camera deployment. Such a system will provide additional information on shark behavior during times when researchers are not present, serve as an early warning system to shark predatory behavior and thus, increase to probability of a rapid intervention. The system would be mounted on a 12-15 pole imbedded in the sand and will not use guide wires so as to avoid bird strikes. However, if a bird strike does occur, FWS will be immediately consulted and appropriate action will be taken. Alternatively, with USFWS approval, the observation tower formerly used at Trig might be used for mounting the camera.

6. Fishing personnel: Two persons experienced in safe and effective methods for shark fishing/removal will be assigned to the monk seal program at FFS. These persons will serve a dual role for population assessment and shark removal work. They will participate in the ongoing assessment work until such time as shark activity warrants their reassignment to address that concern.

7. Native Hawaiian Practices and Participation: Hawaiian cultural practices, based on practioner input, will be included in all shark removal efforts. NMFS activities will include a Hawaiian practitioner (if available) for 1-3 months to advise fishing personnel on traditional fishing techniques, collection shark parts from shark carcasses for cultural use, and to help ensure that shark removal and disposal of the remailns are in keeping with Hawaiian cultural practices. If a Hawaiian practioner is on site, their observational activities related to shark removal efforts and monk seal population assessment will be in accordance with the guidelines outlined in existing permits from NMFS and USFWS, to ensure there is no unathorized disturbance to the wildlife or habitat. To this end, the Hawaiian cultural specialist will observe the activities of the shark removal team, but must follow their instructions to ensure there are no violations of USFWS regulations, the ESA, or the MMPA. All NMFS related activities will be conducted under the oversight of the field camp leader.

8. Shark monitoring without fishing: Once shark activity and/or shark predation has been documented at an islet, the shark team (or the monk seal assessment team) may periodically visit the islet to conduct shark monitoring observations not associated with a fishing effort. This monitoring will be conducted primarily from the boat to ensure that no seals, turtles, or other species will be disturbed by the monitoring activities. Shore-based observations may be authorized by the NMFS camp leader on larger islets such as the Gins. Shark observational data will be collected using the protocols established at Trig Island, 2001-2003 and adapted for Round Island in 2003.

9. Predation alert protocol: All personnel engaged in monk seal population assessment at FFS will be alert for evidence of shark predation at any site within the atoll. If Galapagos sharks are observed displaying predatory behaviors, they will immediately notify the shark fishing team and will begin collecting observational data using the protocols established at Trig Island, 2001-2003 and adapted for Round Island in 2003 (approved by USFWS on June 4, 2003). They will remain on site whenever possible until the fishing team has arrived (contingent upon other duties).

10. Pre-fishing monitoring: When the shark team is dispatched to a site to conduct fishing, the objective will be to monitor shark behavior for a minimum of 30 minutes before initiating any fishing operations. This objective will be tempered or modified by pup safety considerations. Specifically, if 1) any pup is in a situation where it may be vulnerable to shark predation, and 2) sharks are displaying active predatory behavior, then fishing may be immediately initiated.

11. Criteria for classifying shark predatory behavior will conform to the previously established guidelines. During the period when shark observations are underway (including while bait is in the water), shark activity will be coded using the following categories:

- Code 1: Cruising, remains in water >2m depth and shows no behavior directed towards monk seal pups; no obvious signs of predatory behavior.
- Code 2: Patrolling, repeated passes in water less than/equal to 2m depth; apparently hunting pups.
- Code 3: Makes directed approach to seal
- Code 4: Charges seal, clearly attempts to attack
- Code 5: Injures or kills pup

12. Criteria for Removal: Seven years of intensive observations at Trig Island (1997-2003) have revealed that Galapagos sharks hunt or pursue pre-weaned monk seal pups in shallow water (<2 m) during monk seal pupping season. This behavior was persistent and predictable and can be used to target individual sharks for removal. Galapagos sharks identified for removal will have exhibited conspicuous predatory behavior, defined as actively pursuing or hunting for pre-weaned pups in water less than two meters deep (Codes 2-5, above). (To ensure reliability in species identification and interpretation of shark predatory behavior, at least one member of the shark fishing team will have previously participated in the shark monitoring and fishing program at Trig Island).

13. Effective Sighting Area for Fishing: Fishing activities will be confined to a predefined effective sighting area around each islet. For Trig Island, the effective sighting area will be defined as waters less than two meters in depth, remaining within ¼ mile radius from the island. For sites other than Trig, the sighting/fishing area will be waters of any depth within 100 m from the islet.

14. Fishing/Removal methods from shore (Trig-fishing): Once a shark has been targeted for removal, bait will be deployed from shore so that it remains within the effective sighting area. Bait soak time will be limited to one hour following the last sighting of a targeted shark to reduce the possibility of attracting additional sharks to the area. Currents will be noted, and the bait will be placed in an area that will avoid any risk of scent emanating from the bait to attract other sharks or put seals at additional risk. To optimize the ability to catch sharks attempting to prey on monk seal pups, fishing from shore may require deploying bait from a kayak in water < 2 m and up to 20 meters from shore. A kayak may be used to ensure proper placement of the baited hook. The line will be tended at all times to ensure that only the targeted Galapagos sharks are hooked. No personnel will enter the water during culling activities. Predatory Galapagos sharks will be taken by one of three methods described below:

Targeted Galapagos sharks may be caught from shore using a single baited hook that can always be seen by the fisher. When a shark is hooked, it will be brought to shore and euthanized with a 44-cal. "bang stick."

A spear-gun may be used as an alternative to hooking. A barbed shaft, shot from a spear-gun, will be attached to wire cable and connecting line that will be used to retrieve sharks to the beach for euthanasia.

A hand-held harpoon may be used. The harpoon will have a detachable barbed head tethered to a line which will be used to haul the shark to shore for euthanasia. A small caliber (.223) charged harpoon gun will also be used in 2006. This device can be fired in the air at Galapagos sharks attempting to prey on monk seal pups. A similar device was used to propel darts for the collection skin samples from dolphins last summer.

15. Fishing on or in vicinity of small islets (non-Trig fishing): At Trig Island, fishing will be conducted primarily from shore, unless circumstances indicate that boat-fishing would be more productive. At other sites, fishing from the boat is the preferred method, but experience gained at Round Island in 2003 indicates that in some cases, fishing from the boat may not be an efficient means for catching

sharks. This is because the inability to enter the water from the boat hampers the use of the speargun; depth and complex reef topography may severely restrict boat-based operations; prevailing currents and limitations on suitable boat placement may make it difficult to deploy bait downcurrent of the islet; and the boat can act as a deterrent to the approach of sharks. In situations where boat-based fishing is impractical or ineffective, the shark team may fish from shore providing that the following factors are considered:

- Shark monitoring data will continue to be collected primarily from the boat prior to removal efforts, and during removal efforts if personnel are available
- An assessment of the number of total seals, mother/pup pairs on island (as well as their activity/sensitivity levels) indicates that on-island fishing will not result in excessive disturbance or displacement of seals
- The monk seal field camp leader will be consulted prior to landing whenever possible
- No sharks will be landed on small islets (including Round Island). All sharks which are harpooned, speared, or caught with a hook will be allowed to run a short distance from the island before being retrieved by the boat
- Under most circumstances a single person would be deployed on island while the second person would re-anchor the boat a short distance away (both personnel will be in constant visual/radio contact, and the boat person will be ready to pick the person up from the island within 1-2 minutes time)
- The length of time personnel remain on-island will be contingent on the disturbance risk imposed by their presence. This will be determined according to such factors as the number of total seals present, the number of mother/pup pairs, any injured seals on-island, and the distribution and activity levels of seals, and the reaction of the seals to the person on-island. If personnel can remain on island safely without unacceptable disturbance they will remain so even after the targeted shark or sharks exit the sighting area (in practice the person will likely remain on-island for 1-2 hours following the last sighting, provided conditions are acceptable; many sharks have been observed to return to the area within a 2 hour period following departure).
- All sharks will be landed and euthanized from the boat and all necropsies will be performed on the boat, unless circumstances such as weather or impending darkness prevent an on-board necropsy. In these instances, the carcass will be transported to a suitable shore site for necropsy. The necropsy and shark disposal protocol will be conducted under the advice of the Hawaiian practitioner to ensure sensitivity to native Hawaiian cultural practices.

Removal effort at non-Trig locations may occur in water of any depth within 100 m of the islet. Predatory shark behavior (Codes 2-5 above) towards mothers/pups may occur on shallow reefs adjacent to islets, and also adjacent to water deeper than 2 meters; this may necessitate fishing activities in water >2 m deep. In all such cases, fishing efforts will cease at any time that the fishers are no longer confident that the shark being targeted is the same individual as was observed exhibiting the predatory behavior.

Removal methods will be the same as used at Trig: baited hook, harpoon, small caliber harpoon, or speargun. Procedures will be identical to those used at Trig except the boat will be the preferred fishing platform, rather than shore.

16. Use of artificial seal: In all instances, once a shark has displayed predatory behavior sufficient for it to be selected for removal, researchers may use mock-up of a monk seal pup to attract the shark. Procedures for using the mock-up will be similar to those for using bait. The mock-up will be deployed from shore, boat, or kayak so that it remains within the effective sighting area. The mock-up will usually be deployed after the bait has been deployed, so the soak time will generally be less than one hour (the time limit for bait). The mock-up will be used only after a shark has exhibited aggressive behavior toward pups or mother-pup pairs as defined above, and has been selected for removal.

17. Additional safety considerations: All removal operations will be conducted so as not to endanger nearby monk seals by attracting or concentrating sharks to an area where pups are vulnerable. Also, the fishing team will exercise prudent judgment in determining whether all conditions (environmental conditions, physical setting, and other) are conducive to safe and successful operations without incurring undue risk to themselves, their equipment, or other resources.

18. Number of sharks: This application requests lethal take of up to 15 Galapagos sharks. Additional removals may be requested if continued mitigation is considered necessary. Galapagos sharks will be removed in increments of five using the techniques described above. After the removal of the fifth Galapagos shark, a field report of research activities and removal efforts will be provided to a joint USFWS/NMFS review panel to determine if the culling activity should cease. The review panel will be given up to two days to review the information and make a determination. The decision to continue removing sharks will be based on an evaluation of the possible impacts to other wildlife (e.g., turtles), compliance with the terms of the permit, and the report of activities supplied by field personnel.

19. Removal locations: Shark removal may occur at any of the emergent islets within French Frigate Shoals where monk seal pups are present and Galapagos sharks have exhibited distinct predatory behavior as determined using the aforementioned criteria. However, as previously noted, removals are only allowed at the time predatory behavior is observed (that is, fishing is not allowed if a pup loss was recently detected, but no active predatory behavior is currently underway).

20. Shark carcass handling and disposal: As noted above concerning fishing on islets other than Trig, necropsies will be conducted in the boat wherever possible, and under the advice of a Hawaiian practitioner. In all cases, Galapagos shark necropsies will be performed at locations where blood, viscera, and other remains will not enter the water. Teeth and ventral (belly) skin will be retained from each carcass for cultural use. After all samples and data have been collected, shark carcasses will be discarded at the closest deep water location outside of the USFWS refuge.

21. Fishing effort and post-removal reports: As agreed upon by USFWS and NMFS (August 18, 2001), information concerning the removal of each shark will include environmental conditions at the time of removal, criteria used to determine the shark targeted for removal, identifying tags and physical features of the shark removed, history of previous shark sightings, removal methodology, and method of euthanasia. Information collected from each shark carcass will include morphometric measurements, genetic samples, stomach contents, and reproductive status. Tissue samples from sharks will be analyzed to quantify compounds of potential concern at acceptable detection limits to include total metals, polychlorinated biphenyls, organochlorine pesticides, percent lipid and moisture, and fatty acid analysis for possible detection of monk seal consumption.

22. Shark activity reports: Throughout the season, periodic shark activity updates will be submitted for agency review, and will provide (at a minimum) the following information:

- Number of pups born and currently present at each islet
- Date and location of shark related pup injuries, deaths and disappearances at all sites;
- Summary of observed shark activity at each site
- Date, time and method of removal for each shark collected
- Biological data collected from all sharks removed;
- Any other information pertinent to the ongoing evaluation of this project

11. Funding sources (attach copies budget & funding sources).

All projects are funded by NOAA, National Marine Fisheries Service.

12. List all literature cited in this application as well as all other publications relevant to the proposed project.

Alcorn, D. J., and A. K. H. Kam. 1986. Fatal attack on a Hawaiian monk seal, (Monachus schauinslandi). Mar. Mamm. Sci. 2:313-315.

Balazs, G. H., and G. C. Whittow. 1979. First record of a tiger shark observed feeding on a Hawaiian monk seal. 'Elepaio 39:107-109.

Compagno, L. J. V. 1984. Sharks of the World, FAO Fisheries Synopsis Part 2, 25 (4): 655 pp.

Craig, M. P., M. Shaw, G. Mo, and M. Rutishauser, 1999. Aggressive male behavior and shark predation dramatically increase mortality of Hawaiian monk seal pups at French Frigate Shoals. Abstract in 13th Biennial Conference on the Biology of Marine Mammals, Nov.-28 Dec. 3, 1999, The society for Marine Mammalogy, Wailea, Maui, Hawaii.

Hayes, S. 2002. Galapagos shark predation of monk seal pups at Trig Island, FFS, 2001. U.S. Dep. Comm., NOAA internal report. Pacific Island Fisheries Science Center, Honolulu, HI. 22 pp.

Hiruki, L. M., W. G. Gilmartin, B. L. Becker, and I. Stirling. 1993. Wounding in Hawaiian monk seals (Monachus schauinslandi). Can. J. Zool. 71:458-468.

Johanos, T. C., B. L. Becker, and T. J. Ragen. 1994. Annual reproduction cycle of the female Hawaiian monk seal (Monachus schauinslandi). Mar. Mam. Sci. 10(1):13-30.

Kenyon, K.W., and D. W. Rice. 1959. Life history of the Hawaiian monk seal. Pac. Sci. 13:215-252.

Lucas, Z. and W.T. Stobo. 2000. Shark-inflicted mortality on a harbour seal (Phoca vitulina) population at Sable Island, Nova Scotia. J. Zool. 252(3): 405-414.

National Marine Fisheries Service. 2003. Shark predation at Trig Island, 2002. Internal report (draft). Prep. by Harting Biological Consulting, Bozeman, Mont. for U.S. Dep. Comm., Pacific Island Fisheries Science Center, Honolulu, HI. 53 pp.

National Marine Fisheries Service. 2004. Shark predation at French Frigate Shoals 2003. Internal report (draft). Prep. by Harting Biological Consulting, Bozeman, Mont. for U.S. Dep. Comm., Pacific Island Fisheries Science Center, Honolulu, HI. 50 pp.

National Marine Fisheries Service. 2005a. Shark predation at French Frigate Shoals 2004. Internal report (draft). Prep. by Harting Biological Consulting, Bozeman, Mont. for U.S. Dep. Comm., Pacific Island Fisheries Science Center, Honolulu, HI. 37 pp.

National Marine Fisheries Service. 2005b. Shark predation at French Frigate Shoals 2005. Internal report (draft). Prep. by Harting Biological Consulting, Bozeman, Mont. for U.S. Dep. Comm., Pacific Island Fisheries Science Center, Honolulu, HI. 17 pp.

Rice, D. W. 1964. The Hawaiian monk seal: rare mammal survives in leeward islands. Nat. Hist. 73: 48-55.

Wetherbee, M. W., G. L. Crow, C.G. Lowe. 1996. Biology of the Galapagos shark, Carcharhinus galapagensis, in Hawai'i. Envir. Bio. Fish : 299-310.

13. What types of insurance do you have in place? (attach documentation) All vessels involved in supporting the research are owned by the U.S. Government and are therefore self-insured.

☐ Wreck Removal

☐ Pollution

14. What certifications/inspections do you have scheduled for your vessel? (attach documentation)

☒ Rat free ☐ tender vessel ☐ gear/equipment

☒ Hull inspection ☐ ballast water

15. Other permits (list and attach documentation of all other required Federal or State permits).

Disturbance to monk seals during shark removal efforts is authorized by Scientific Research and Enhancement Permit 848-1695, issued by the NMFS Office of Protected Resources. We have been informed by the USFWS Refuge Manager at French Frigate Shoals (documentation attached) that USFWS will issue a Special Use Permit to authorize removal of up to 15 Galapagos sharks (5 initially, with additional 10 provisional after joint NMFS/USFWS review) based upon our originally proposed methods (excluding use of high-powered rifle).

16. Project's relationship to other research projects within the NWHI State Marine Refuge, National Wildlife Refuge, NWHI Coral Reef Ecosystem Reserve, or elsewhere.

Data and samples from shark monitoring will be shared with researchers from Hawaii Institute of Marine Biology as well as other appropriate researchers as part of research on contaminants, DNA, and distribution of sharks throughout the NWHI.

Section C: Logistics

17. Time Frame:

Project Start Date	Project Completion Date
~June 15, 2006	~September 15, 2006

Dates actively inside the State Marine Refuge.

French Frigate Shoals

i. Dates:~June 15 through ~ September 15 (air charter); Seal Camp Leader: Suzanne Canja
ii. Seal Staff: Elaine Leung and Megan McKinzie
iii. Shark observation/removal staff: Aaron Dietrich, Dan Luers, Hawaiian practitioner TBN

Personnel schedule in the State Marine Refuge (describe who will be where and when).

See above

18. Gear and Materials

☐ Dive equipment ☐ Radio Isotopes

☒ Collecting Equipment ☐ Chemicals (specify types)

Collection equipment for sharks will include baited hook, bang-stick, speargun, or harpoon gun.

19. Fixed installations and instrumentation.

☐ Transect markers ☐ Acoustic receivers

☐ Other (specify)

No fixed installations or instrumentation will be used within the Refuge.

20. Provide a time line for sample analysis, data analysis, write-up and publication of information.

A detailed report of all activities will be prepared by the end of January, 2007.

21. **Vessel Information**:

Vessel Name __Oscar Elton Sette_____ IMO Number __8835097_____

Vessel Owner __U.S. Dept. of Commerce, NOAA Flag ___U.S._____

Captain's Name Cmdr. Mike Devany_____ Chief Scientist or Project Leader _Chad Yoshinaga

Vessel Type _TAGOS class research vessel_____ Call sign ____WTEE_____

Length ____68.3 m_____ Gross tonnage _____2,014_____

Port of Embarkation _____Honolulu _____

Last port vessel will have been at prior to this embarkation __Honolulu, Hawaii____

Total Ballast Water Capacity: Volume _135,000 gal Total number of tanks on ship ____10_____

Total Fuel Capacity: _____163,000_gal_____ Total number of fuel tanks on ship ___14____

Other fuel/chemicals to be carried on board and amounts: Engines hold ~100 gallons of lube oil, but no lube oil storage tanks exist.

- Number of tenders/skiffs aboard and specific type of motors:
- Achilles
  - Quantity: 1
  - Type: Inflatable
  - Length: 14 ft.
  - Hoisting weight: 371 lbs.
  - Propulsion: 40 hp Honda outboard motor
  - Capacity: 6 persons
- Safe boat
  - Quantity: 1
  - Type: Safeboat
  - Length: 15 ft.
  - Hoisting weight: 1,340 lbs.
  - Propulsion: 90 hp Honda outboard motor

- Capacity: 7 persons
- Rescue boat
  - Quantity: 1
  - Type: Ambar Marine, ABM-5
  - Length: 18 ft.
  - Hoisting weight: 3,949 lbs. (with 7 persons)
  - Propulsion: Twin 60 hp Mariner outboard motors
  - Capacity: 7 persons

Does the vessel have the capability to hold sewage and grey-water? Describe in detail. 6000 gal holding tank for grey & black water

Does the vessel have a night-time light protocol for use in the NWHI? Describe in detail (attach additional pages as necessary) No

On what workboats (tenders) will personnel, gear and materials be transported within the State Marine Refuge?
Workboats listed above detailed to the O.E. Sette will be used to transport gear and materials between ship and shore. Workboats at each NWHI site to support the scientific research are as follows: French Frigate Shoals—two 20 ft whalers, each with two 4 stroke Honda engines
How will personnel, gear and materials be transported between ship and shore?
See above
If applicable, how will personnel be transported between islands within any one atoll?
See above

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Fisheries Science Center
2570 Dole St. • Honolulu, Hawaii 96822-2396
(808)983-5300 • Fax: (808)983-2902

May 31, 2006

Athline M. Clarke
Department of Land and
Natural Resources
Division of Aquatic Resources
1151 Punchbowl Street Room 330
Honolulu, Hawaii 96813

Aloha Athline,

Please find enclosed the Pacific Islands Fisheries Science Center's revised permit request for the shark removal experiment at French Frigate Shoals. The significant changes include incorporating Native Hawaiian cultural and traditional uses in the project. This modification addresses comments to the Department of Land and Natural Resources provided by a Native Hawaiian advisory group on May 4, 2006 and earlier comments at the Board Hearing on March 24, 2006.

Other enclosures include: 1. A letter initiating the process of placing a Native Hawaiian cultural representative on the Hawaiian monk seal recovery team; 2. A report from the Association of Hawaiian Civic Clubs Resources Committee on a meeting of the NWHI Ecosystem Reserve Cultural Advisory Council documenting the Council's recommendation to remove up to 15 sharks (with cultural provisions); 3. Text of an e-mail from the USFWS Refuge Manager at Tern Island documenting USFWS commitment to issue a Special Use Permit authorizing take of up to 15 sharks; and 4) A memorandum concerning the Environmental Assessment for the proposed activity.

Just to update you on events at French Frigate Shoals, as of yesterday two preweaned pups had disappeared and a third preweaned pup had been attacked by a shark, incurring severe injuries on the neck and shoulder.

Regards,

George A. (Bud) Antonelis
Chief, Protected Species Division

Encl:

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Fisheries Science Center
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May 31, 2006

Memorandum To: The Record

From: George A. (Bud) Antonelis

Subject: Supplemental Memorandum to Environmental Assessment for Experimental Shark Removal to Enhance Hawaiian Monk Seal Survival at Trig Island, French Frigate Shoals.

In May, 2002 an Environmental Assessment (EA) was prepared for experimental shark removal to enhance the survival of Hawaiian Monk Seal pups at French Frigate Shoals (FFS), Hawaii. This document resulted in a Finding of No Significant Impact (FONSI) approved in June, 2002, and the research commenced shortly thereafter. However, because of various constraints, the planned methodology could not be fully implemented, and the results obtained thus far, while promising, are inconclusive. The purpose of this memorandum is to document the need for additional time to complete the research and to document that the research methods to be used are within the scope of the original EA and associated FONSI.

Background: Preliminary observations during 1997-2001 revealed that Galapagos sharks attack and kill nursing and weaned Hawaiian monk seal pups at Trig Island, FFS, and some sharks were removed. Observations and some short term tagging studies documented that only a limited number of individual sharks were involved (~14-20). Moreover, the preliminary removals (6 total sharks removed during 2000-01) resulted in decreased shark predation on pups and reduced observable shark activity at Trig Island. The present study was designed to a) intensely monitor shark and seal behavior in the areas of known shark predation, b) quickly and efficiently remove sharks which were observed to aggress against and/or attack Hawaiian monk seal pups, and c) document changes in the shark/seal dynamic over time. Proposed methods were removal of up to 15 sharks annually for two years, using baited hook, harpoon, and/or high-powered rifle. The hypothesis was that removal of the remaining aggressive/predatory sharks would lead to continued reduction, if not total elimination, of monk seal pup mortality resulting from Galapagos shark attacks.

Results: Intensive observations were conducted at both Trig Island and other locations within FFS. Several factors were evaluated: change in number of sharks patrolling, change in the occurrence of sharks patrolling, and change in shark-inflicted pup mortality rate.

Change in number and occurrence of patrolling sharks: The hourly rate of daytime shark observations at Trig Island declined from 2001 to 2003, to the extent that by 2003 very few Galapagos sharks were seen. However, shark predation on seal pups continued, with most attacks occurring at night or during twilight, when no personnel were on Trig Island. The decline in observed shark interactions is attributed to the sharks becoming wary of human presence, due primarily to the non-lethal methods (harassing) used to deter sharks prior to 2000, and prior to the first removal efforts each year during 2000-2001.

Change in shark-inflicted pup mortality rate: At Trig/Whaleskate, the number of possible mortalities peaked in 1997-1999 (18-28 possible mortalities each year) and declined thereafter (less than 10 possible mortalities each of the last five years). Although the current predation pressure does not approach the levels of 1997-99, approximately 20% of the annual cohort at FFS is still lost to predation. As predicted, cohort sizes at FFS are dwindling as the population of reproductive females ages and few young seals are recruited into the population: the 2005 cohort was the smallest of any year since population monitoring was initiated in the early 1980s.

Shark removal: In the six years that lethal removal has been practiced, a total of twelve Galapagos sharks have been killed (one in 2000, five in 2001, two in 2002, two in 2003, none in 2004, and two in 2005). Although the original proposal specified removal of up to 15 sharks annually, far fewer sharks have been removed than planned. The number of removals was less than anticipated because of increased wariness and other behavioral changes (e.g. attacking at night) by the individual sharks, and resulting inefficiency of shark removal (fishing) methods.

Plan of Action: The level of mortality inflicted upon Hawaiian monk seal pups at FFS continues to severely impact the subpopulation, and is a factor contributing to the continued decline of the Hawaiian monk seal population. The shark removal experiment has constrained the number of losses that would have occurred without the program. However, the current methodology was not sufficiently aggressive to fulfill the original intent of the experimental design. Specifically, the removal methods performed to date have been inefficient (in terms of both cost and effort) and may have acted to make predatory sharks more wary and less vulnerable to removal. We therefore plan to continue the study using more efficient removal methods. These methods (high-powered rifle used from shore) were evaluated as part of the original EA, and their associated impacts were considered and found to be insignificant. The overall parameters of the study remain the same, namely to document change in occurrence and frequency of shark inflicted injuries and mortality to preweaned pups at FFS, and to assess any change in number or occurrence of patrolling sharks as a result of shark removal. To implement these studies and to fully meet the intent of the original study design, more time will be required to conduct the experiment. Thus, work will continue with no set completion date, but rather will rely on the relative success of more aggressive techniques for shark removal.

cc: S. Pooley
M. Luipold

Association of Hawaiian Civic Clubs
Ocean Resources Committee

Report

On
Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve
Reserve Cultural Advisory Council Meeting
May 20, 2006

Reserve Conference Room
9:30am – 1:00pm
Honolulu

The second NWHI Reserve Cultural Advisory Council (RAC) meeting was held on Saturday, May 20, 2006 in the NOAA Conference Room in Honolulu. The meeting was presided over by William Aila.

Council members present:	Wilma Holi (Kauai) Edward Ayau Louis (Buzzy) Agard Carlos Andrade Cha Smith (KAHEA) Kehau Watson
NOAA staff included:	Aulani Wilhelm Kekuewa Kikiloi Hoku Johnson

Meeting Agenda

The original intent of the meeting was to discuss the Draft Environmental Impact Statement (DEIS) for the NWHI, but since the document had not been released it was agreed upon to discuss the Hawaiian cultural issues in regards to approving entry permits for the area.

Once the DEIS is released, it will be mailed to council members for review. General access will be provided through a website.

Issue Discussion

Hawaiian Names for NWHI

There was concern that the impression in the public is that this committee would be the decision maker in providing the Hawaiian name for the NWHI Reserve area. It was agreed upon that more research on cultural knowledge (mo'olelo) and historical documents would need to be done. Hawaiians from different districts use the NWHI for

different reasons and there may be names associated with the area already in use. Final decision would be made by: Pua Kanahele, Louis Agard and Leo Ohai. Original Hawaiian names for the islands would be used instead of the current English names.

Appropriate Permits

The difference between Native Hawaiian and non-native applications were discussed. Possibilities included differences in regulations for different areas. Islands are different in resource and topographical conditions.

Permits must be approved by both the National Marine Fisheries Service (NMFS) and the State Board of Land and Natural Resources (BLNR).

Galapagos Shark – Monk Seal

Dr. Bud Antonellis, Director for the Protected Species Division for NMFS brought forth concerns on the endangered Hawaiian Monk Seal. In the French Frigate Shoals, the weaning monk pups are being eaten at an alarming rate by the aggressive Galapagos Shark. After much consideration, it was determined by Dr. Antonellis department that the only recourse to protect the seal was to remove 15 of the most aggressive sharks from the area. The group consensus was to remove the sharks on the following conditions: 1) that all cultural protocol was followed; and 2) that the appropriate parts of the shark be used and distributed within the Native Hawaiian community.

Respectfully Submitted,

Robert DaMate
Ocean Resources Committee

"Bud Antonelis" <Bud.Antonelis@noaa.gov>
05/30/06 01:54 PM

To Athline.M.Clark@hawaii.gov
cc
bcc
Subject [Fwd: USFWS permitted activities for Galapagos shark removal]

FYI the approval to proceed with the shark study from FWS...

----- Message from Angela_Anders@fws.gov on Tue, 23 May 2006 15:47:23 -1000 -----
To: Bud.Antonelis@noaa.gov
Subject: USFWS permitted activities for Galapagos shark removal

Dear Dr. Antonelis:

This letter pertains to your National Wildlife Refuge Special Use Permit application on Enhancing Hawaiian monk seal pup survival at French Frigate Shoals (Hawaiian Islands National Wildlife Refuge) submitted on 2 March 2006 by the Pacific Islands Fisheries Science Center to the Pacific Remote Islands National Wildlife Refuge Complex. The U.S. Fish and Wildlife Service (USFWS) is willing to permit the requested activities at French Frigate Shoals, including removal of up to 5 Galapagos sharks, at which time USFWS will review a report of research and removal activities to determine whether removal of up to an additional 10 Galapagos sharks is warranted. Permitted removal would include the methods requested, with the exception of a high-powered rifle.

I would request at this time that you submit a revised Special Use Permit application to our office, omitting the section on rifle use. Please let me know if you have any additional questions regarding your permit application.

Best regards,
Angela Anders

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Angela D. Anders, M.A.
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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
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May 16, 2006

Joshua Ginsberg, Ph.D.
Chairman, Monk Seal Recovery Team
Wildlife Conservation Society
2300 Southern Boulevard
Bronx, NY 10460

Josh:

In your role as Chairman of the Monk Seal Recovery Team I want to inform you that I intend to appoint a Native Hawaiian representative to the team prior to the next annual meeting which will occur on September 6-8 in Honolulu.

NMFS has been remiss in not including a Native Hawaiian representative to this point. The cultural perspectives such a representative could provide to the team will greatly assist in developing management and conservation measures that promote our goal of the recovery of the Hawaiian monk seal to a robust, sustainable population.

Over the coming weeks I will be working closely with Native Hawaiian representatives, the State of Hawaii, and the Pacific Islands Fisheries Science Center to invite a representative that can advise the team of Hawaiian cultural considerations to incorporate into our research and management strategies.

Please contact me if you have any questions or suggestions on this endeavor.

Thank you,

Brandee Gilka
for

Chris E. Yates
Assistant Regional Administrator
For Protected Resources
Pacific Islands Regional Office
National Marine Fisheries Service